

Novel Polymer Microfluidics Technology for In Situ Planetary Exploration, Phase II

Completed Technology Project (2009 - 2013)



Project Introduction

Los Gatos Research proposes to develop a novel microfluidic device that combines rigid monolithic porous polymer based micro-capillary electrochromatography (microCEC) with ultra-high sensitive UV laser induced fluorescence (LIF) optical detection capable of accurately measuring concentrations of polycyclic aromatic hydrocarbons (PAH) molecules. This novel device is ultra-compact and light weight with low power consumption, ideally suited for NASA planetary science applications such as analyzing

Anticipated Benefits

The proposed polymer microfluidics and optical technologies can be readily adapted to NASA's miniature "Micro Laboratories" scientific instrumentations for in-situ exploration of the solar system. In particular, it is directly applicable to analyze PAH and other neutral organic molecules on Mars and Titan surfaces. The proposed technology has other broad NASA applications including on-chip biosensors, electrochemical sensors, wet-chemistry systems, as well as high pressure micropumps for fluid positioning, mixing, metering, storage, and filtering systems. In addition, the novel microfluidics technology is naturally suited to such applications as clinical diagnostics, spacecraft and biosphere environmental monitoring, and toxicology studies. The microfluidics technology described in this proposal is directly applicable for terrestrial analysis for PAH molecules in health and environmental studies. Compared to existing micellar electrokinetic chromatography and reverse-phase HPLC, the microCEC technology described in this proposal offers a natural alternative providing inexpensive, rapid, nondestructive, in-situ techniques for the measurement of PAH contamination in sediments. Additional commercial devices based on such microfluidics technology envisioned include components for DNA, protein and drug separation and analysis, chemical analysis systems, drug delivery systems, and embedded health monitoring systems.



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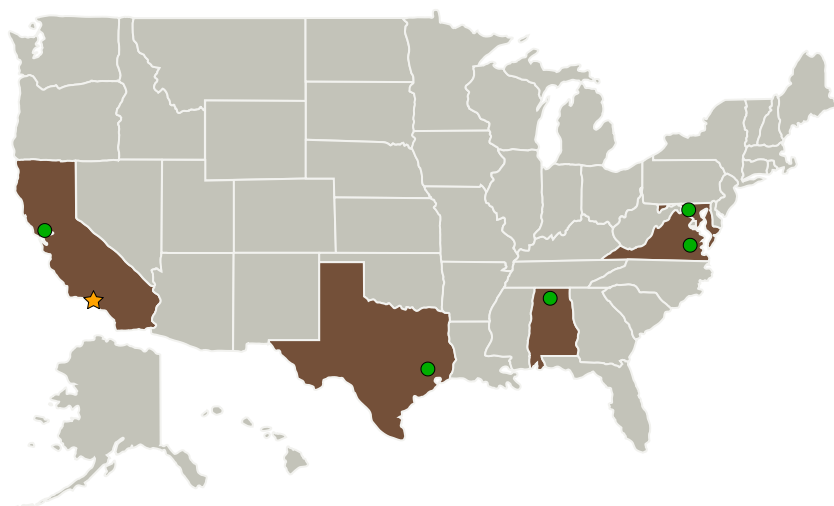
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
Los Gatos Research	Supporting Organization	Industry	Mountain View, California
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Gary C Jahns

Principal Investigator:

Nathan Bramall

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Primary U.S. Work Locations

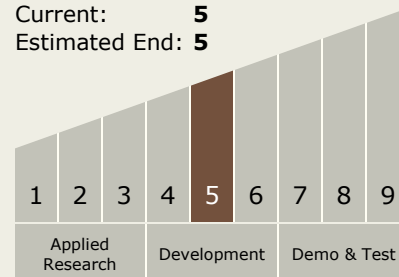
Alabama	California
Maryland	Texas
Virginia	

Project Transitions

**December 2009:** Project Start**March 2013:** Closed out

Technology Maturity (TRL)

Start: **5**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.3 In-Situ Instruments and Sensors
 - TX08.3.3 Sample Handling